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**Topical plan for JINR research and international cooperation, Nuclear Physics (03),
Theme (03-5-1094-2010/2016):** Synthesis and Properties of Nuclei at the Stability Limits.

Project: Heavy ion collisions products detection at ACCULINNA

Project is addressed to 1 – 2 students.

Project description:

1. Getting familiar with the ACCULINNA/ ACCULINNA-2 separators - design and the principle of operation.
2. Getting familiar with detectors and reaction products detection techniques in experiments at the ACCULINNA separator; silicon detectors (Si), scintillators (Csi(Ta), stilbene crystals). Identification of the reaction products on ΔE -E, ΔE -TOF experimental spectra, performing simulations in the LISE ++ program.
3. Getting familiar with charged particle detection technique applied in the OTPC (Optical Time Projection Chamber) and the 'mini OTPC' detector system for studies of light emission from gas mixtures used in the OTPC.
4. Performing detectors calibration with radiation sources. $\gamma(^{60}\text{Co}, ^{137}\text{Cs})$, $\alpha(^{226}\text{Ra})$, (^{252}Cf) .

The main goal of the practice is to get basic experience in charged particles detection techniques used for detection of the reaction fragments at the ACCULINNA separator and neutron detection techniques. They will get practical experience how to work with charged particle detectors and they will perform detectors (Si, Csi(Ta), stilbene crystals) calibration using radioactive sources, $\gamma(^{60}\text{Co}, ^{137}\text{Cs})$, $\alpha(^{226}\text{Ra})$, and (^{252}Cf) .

Students will perform a number of simulations of experimental spectra in LISE++ code.

Moreover students will get basic knowledge about novel technique of charged particle detection - the setup of the OTPC spectrometer and with 'mini OTPC' detector system and for studies of the light emission from gas mixtures used in the OTPC spectrometer.

During the summer training students get introduction to the main studies at the Flerov Laboratory of Nuclear Reactions and to the main area of studies at the ACCULINNA separator. The project of the new separator ACCULINNA-2 will be introduced.

A series of excursions to the main experimental facilities at FLNR will be organized (microtron MT-25, cyclotron IC-100 and U400M)

Requirements:

The project is related to students and PhD students interested in nuclear physics, experimental physics and particle detection techniques. Basics knowledge in nuclear physics is nice seen.

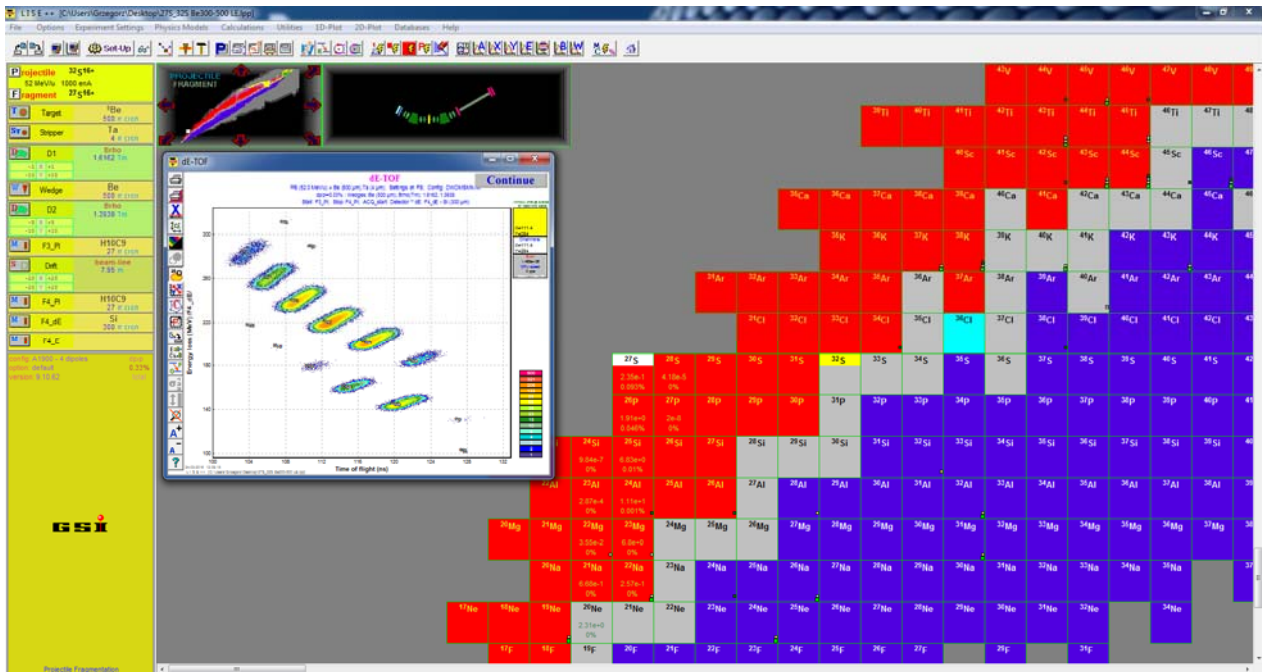


Fig. 1. Lise ++: program for simulation of nuclear reactions/ transmission of the reaction fragments trough the separator.



Fig. 2. Some instrumentation available at ACCULINNA: Opened reaction chamber view, charged particle telescopes, stilbene neutron detector array, GADAST γ -detector array, and Warsaw OTPC.

Useful links:

<http://fls2.jinr.ru/flnr/index.html>

<http://aculina.jinr.ru/>

<http://lise.nslc.msu.edu/lise.html>

<http://indico.cern.ch/event/3062/contribution/135/material/poster/0.pdf>

http://www.fuw.edu.pl/~pfitzner/Research/2pDecay/Talks/MPF_ISOLDE_L1.pdf